

AMENDMENT

In the Claims

Please amend claims 1, 2, 4, 5, 7, 10, 12, 15, 17, 18, 21, 23, 26, 29, and 52 as follows:

1. (Currently Amended) A method of adjusting forming a resonant cavity of a laser device, the laser device having a laser gain medium and an intracavity waveguide segment within a resonant cavity, the intracavity waveguide segment characterized by an effective refractive index profile, the resonant cavity characterized by a round trip optical length defining a free spectral range between adjacent longitudinal mode frequencies of said laser device, the method comprising:

forming a portion of the intracavity waveguide segment to effect a negative thermo-optic refraction index coefficient such that an effective round trip optical path length of the resonant cavity is substantially athermal;

operating the laser device to produce an optical output;
monitoring the optical output to determine the free spectral range of the laser device; and

permanently modifying the effective refractive index of at least a portion of the intracavity waveguide segment until said free spectral range substantially equals a predetermined rational fraction of a specified frequency channel spacing over a portion of an operating frequency band.

2. (Currently Amended) The method of claim 1 56 wherein permanently modifying said effective refractive index comprises illuminating said intracavity waveguide segment with an energy beam.

3. (Original) The method of claim 2 wherein said energy beam comprises electromagnetic radiation in the form of ultraviolet radiation and induces a chemical alteration in said intracavity waveguide segment.
4. (Currently Amended) The method of claim 2 wherein said intracavity waveguide segment further comprises a polymer structure and said electromagnetic radiation induces crosslinking in said polymer material structure.
5. (Currently Amended) The method of claim 4 56 wherein permanently modifying said effective refractive index comprises removing material from a portion of said intracavity waveguide segment.
6. (Original) The method of claim 5 wherein said removing step further comprises the steps of:
 - projecting an energy beam onto said optical material, and
 - ablating said optical material.
7. (Currently Amended) The method of claim 4 56 wherein permanently modifying said effective refractive index comprises depositing effective refractive index modifying material onto said intracavity waveguide segment.
8. (Original) The method of claim 7 wherein said depositing step further comprises the steps of:
 - evaporating target material, and
 - directing said target material towards said intracavity waveguide segment.

9. (Original) The method of claim 8 wherein a mask is used to delimit the region of said intracavity waveguide segment exposed to said target material.

10. (Currently Amended) The method of claim 1 wherein said intracavity waveguide segment comprises a core characterized by a first refractive index and cladding around said core characterized by a second refractive index having a negative thermal optic refractive index coefficient, optical energy from said laser gain medium propagating through said intracavity waveguide segment in both said core and at least a portion of said cladding, said first and second refractive indices and a proportion of optical energy propagating in said cladding relative to said core determining a value of said effective refractive index of said intracavity waveguide segment, and wherein said modifying step comprises modifying at least one of said first and second refractive indices and said proportion.

11. (Original) The method of claim 10 wherein said cladding comprises a polymer structure.

12. (Currently Amended) The method of claim 4 56 wherein said round trip optical length is designed to differ from the optimal round trip optical length in a direction and by a mean amount that can be compensated by applying one of the processes of radiation exposure, material removal, or material deposition.

13. (Original) The method of claim 1 wherein said monitoring step includes determining at least one longitudinal mode frequency and said modifying step continues until at least a subset of the longitudinal frequencies coincide with said assigned channels.

14. (Original) The method of claim 1 wherein said modifying step is preformed during the operation and monitoring steps.

15. (Currently Amended) The method of claim 1 further including the step of:
permanently modifying the effective refractive index of a second portion of the intracavity waveguide segment to modify said free spectral range.

16. (Original) The method of claim 1 wherein the laser device further comprises a heater electrode adjacent to the intracavity waveguide segment, wherein the intracavity waveguide segment is thermo-optic, and wherein modifying said effective refractive index comprises heating said intracavity waveguide segment.

17. (Currently Amended) A method of adjusting forming a resonant cavity of a waveguide device, the waveguide device having an intracavity waveguide segment within a resonant cavity, the intracavity waveguide segment characterized by an effective refractive index profile, the resonant cavity characterized by a round trip optical length defining a free spectral range between adjacent longitudinal mode frequencies of said waveguide device, the method comprising:
forming a portion of the intracavity waveguide segment to effect a negative thermo-optic refraction index coefficient such that an effective round trip optical path length of the resonant cavity is substantially athermal;
illuminating the resonant cavity with diagnostic light to produce an optical output;

monitoring the optical output to determine the free spectral range of the waveguide device; and

permanently modifying the effective refractive index of at least a portion of the intracavity waveguide segment until said free spectral range substantially equals a predetermined rational fraction of a specified frequency channel spacing over a portion of an operating frequency band.

18. (Currently Amended) The method of claim 17 57 wherein permanently modifying said effective refractive index comprises illuminating said intracavity waveguide segment with an energy beam.

19. (Original) The method of claim 18 wherein said energy beam comprises electromagnetic radiation in the form of ultraviolet radiation and includes a chemical alteration in said intracavity waveguide segment.

20. (Original) The method of claim 18 wherein said intracavity waveguide segment further comprises a polymer structure and said electromagnetic radiation induces crosslinking in said polymer material.

21. (Currently Amended) The method of claim 17 57 wherein permanently modifying said effective refractive index comprises removing material from a portion of said intracavity waveguide segment.

22. (Original) The method of claim 21 wherein said removing step further comprises the steps of:

projecting an energy beam onto said optical material, and
ablating said optical material.

23. (Currently Amended) The method of claim 17 57 wherein permanently modifying said effective refractive index comprises depositing effective refractive index modifying material onto said intracavity waveguide segment.

24. (Original) The method of claim 23 wherein said depositing step further comprises the steps of:
evaporating target material, and
directing said target material towards said intracavity waveguide segment.

25. (Original) The method of claim 24 wherein a mask is used to delimit the region of said intracavity waveguide segment exposed to said target material.

26. (Currently Amended) The method of claim 17 57 wherein said round trip optical length is designed to differ from the optimal round trip optical length in a direction and by a mean amount that can be compensated by applying one of the processes of radiation exposure, material removal, or material deposition.

27. (Original) The method of claim 17 wherein said monitoring step includes determining at least one longitudinal mode frequency and said modifying step continues until at least a subset of the longitudinal mode frequencies coincide with said assigned channels.

28. (Original) The method of claim 17 wherein said modifying step is performed during the operating and monitoring steps.

29. (Currently Amended) The method of claim 17 57 further including the step of:

permanently modifying the effective refractive index of a second portion of the intracavity waveguide segment to modify said free spectral range.

30. (Original) The method of claim 17 wherein said illuminating step further comprises the steps of:

operating a light source and
coupling diagnostic light produced by the source into said intracavity waveguide segment.

31. (Original) The method of claim 30 wherein said light source is a tunable single frequency laser and wherein said illuminating step further comprises the step of:

tuning a frequency of the diagnostic light.

32. (Original) The method of claim 30 wherein said light source is a broad band light source and wherein said monitoring step further comprises the step of:
determining the spectrum of said optical output.

33. (Original) The method of claim 30 wherein said coupling is performed at an index grating traversed by optical energy propagating through said intracavity waveguide segment and wherein said illuminating step further comprises the step of:

phase matching said grating for coupling an optical frequency of said light source into a longitudinal mode of said resonant cavity.

34. (Original) The method of claim 33 further comprising the step of:
actuating a heater element disposed adjacent to said index grating.

35. (Original) The method of claim 17 wherein the waveguide device further
comprises a heater electrode adjacent to the intracavity waveguide segment,
wherein the intracavity waveguide segment is thermo-optic, and wherein
modifying said effective refractive index comprises heating said intracavity
waveguide segment.

52. (Currently Amended) A method comprising:
forming an intracavity waveguide segment, a portion of the intracavity
waveguide segment to effect a negative thermo-optic refractive index coefficient
such that an effective round trip optical path length of a resonant cavity of a laser
device including the intracavity waveguide segment is substantially athermal;
operating a laser device to produce an optical output signal having a free
spectral range that is a function of the round trip optical path length of the
resonant cavity, the laser device having a resonant cavity and an intracavity
waveguide segment having an effective refractive index;
determining the free spectral range of the optical output signal; and
responsive to the determined free spectral range, permanently modifying
the an effective refractive index of at least a portion of the intracavity waveguide
segment so that the free spectral range substantially equals a predetermined
value.

53. (Previously Amended) The method of Claim 52 wherein permanently
modifying the effective refractive index comprises illuminating the portion of the
intracavity waveguide segment with a beam.

54. (Previously Amended) The method of claim 53 wherein the beam comprises electromagnetic radiation selected to chemically alter the illuminated portion of the intracavity waveguide segment.

55. (Previously Amended) The method of claim 54 wherein the portion of the intracavity waveguide segment comprises a polymer structure in which the electromagnetic radiation cause crosslinking.

Please add new claims 56 and 57, as follows:

56. (New) The method of claim 1, further comprising:

permanently modifying the effective refractive index of said at least a portion of the intracavity waveguide segment.

57. (New) The method of claim 17, further comprising:

permanently modifying the effective refractive index of said at least a portion of the intracavity waveguide segment.